APPENDIX B

Aquatic Organisms

Algae Important in Water Supplies (ref. B-1).

- Taste and odor algae
- Filter clogging algae
- Polluted water algae
- Clean water algae
- Plankton and other surface water algae
- Algae growing on reservoir walls

Types of Freshwater Algae (ref. B-2).

Simple Assessment of Bottom-Dwelling Insects (ref. A-2).

SCS Key to the Major Invertebrate Species of Stream Zones (ref. B-3).

Diagrams of Common Fish Species (ref. B-4).

Detection of *Escherichia coli* in water samples (ref. B-5).

Table B-1.—Taste and odor algae.

Species Names	Linear Magnifications
Anabaena plactonica	250
Anacystis cyanea	250
Aphanizomenon flos-aquae	250
Asterionella gracillima	250
Ceratium hirundinella	250
Dinobryon divergens	250
Gomphosphaeria lacustris, kuetzingianum type	500
Hydrodictyon reticulatum	10
Mallomonas caudata	500
Nitella gracilis	1
Pandorina morum	500
Peridinium cinctum	500
Staurastrum paradoxum	500
Synedra ulna	250
Synura uvella	500
Tabellaria fenestrata	250
Uroglenopsis americana	125
Volvox aureus	125

Table B-2.—Filter clogging algae

Species Names	Linear Magnifications
Anabaena flos-aquae	500
Anacystis dimidiata	1000
Asterionella formosa	1000
Chlorella pyrenoidosa	5000
Closterium moniliferum	250
Cyclotella meneghiniana	1500
Cymbella ventricosa	1500
Diatoma vulgare	1500
Dinobryon sertularia	1500
Fragilaria crotonensis	1000
Melosira granulata	1000
Navicula graciloides	1500
Oscillatoria princeps (top)	250
Oscillatoria chalybea (middle)	250
Oscillatoria splendida (bottom)	500
Palmella mucosa	1000
Rivularia dura	250
Spirogyra porticalis	125
Synedra acus	500
Tabellaria flocculosa	1500
Trachelomonas crebea	1500
Tribonema bombycinum	500

Table B-3.—Polluted water algae.

Species Names	Linear Magnifications
Agmenellum quadriduplicatum, tenuissima type	1000
Anabaena constricta	500
Anacystis montana	1000
Arthrospira jenneri	1000
Carteria multifilis	2000
Chlamydomonas reinhardi	1500
Chlorella vulgaris	2000
Chlorococcum humicola	1000
Chlorogonium euchlorum	1500
Euglena viridis	1000
Gomphonema parvulum	3000
Lepocinclis texta	500
Lyngbya digueti	1000
Nitzschia palea	2000
Oscillatoria chlorina (top)	1000
Oscillatoria putrida (middle)	1000
Oscillatoria lauterbornii (bottom)	1000
Phacus pyrum	1500
Phormidium autumnale	500
Pyrobotrys stellata	1500
Spirogyra communis	250
Stigeoclonium tenue	500
Tetraedron muticum	1500

Figure B-1

Algae Important in Water Supplies.

Taste and Odor Algae

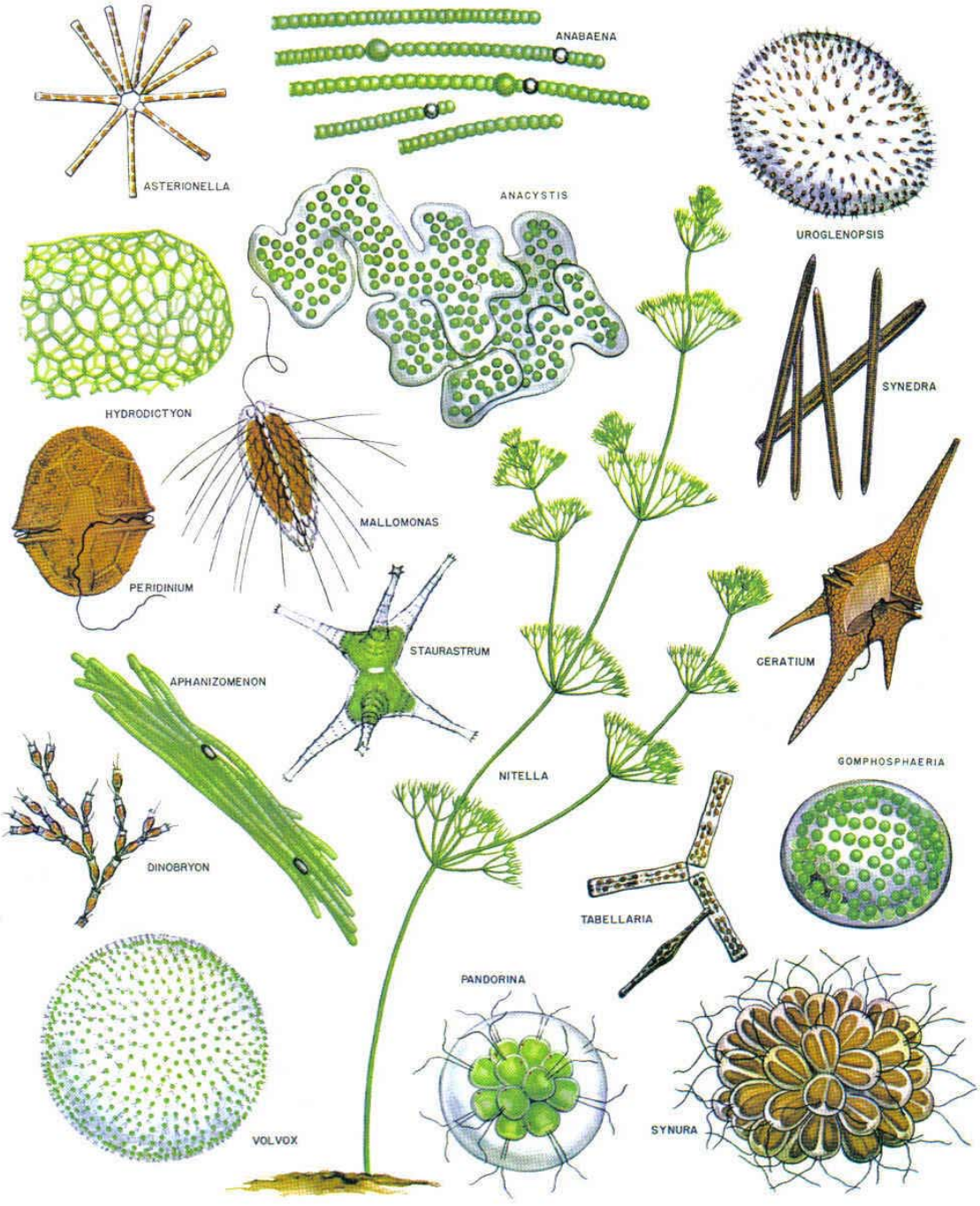


Figure B-2

Filter Clogging Algae.

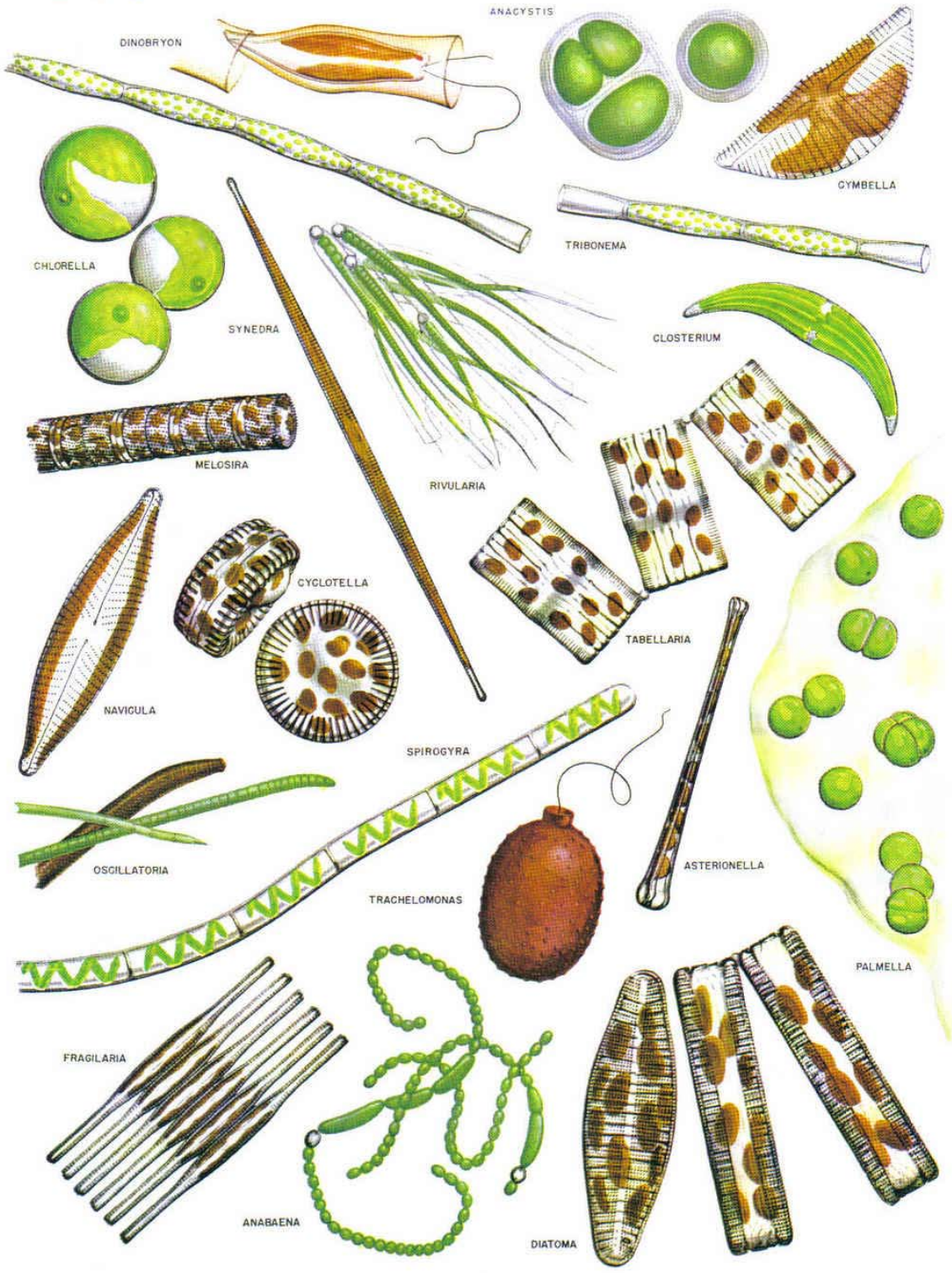


Figure B-3

Polluted Water Algae.

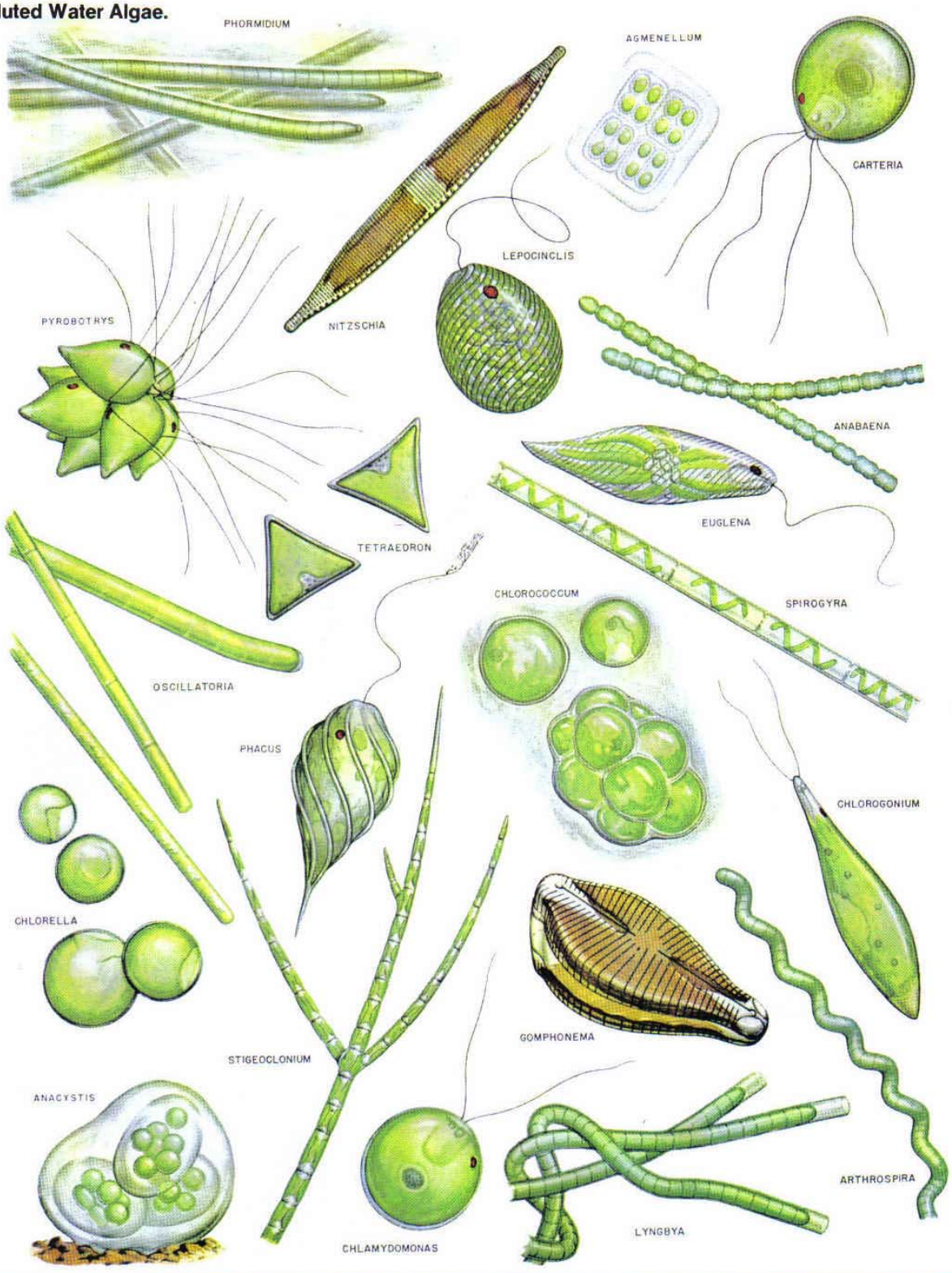


Figure B-4

Clean Water Algae.

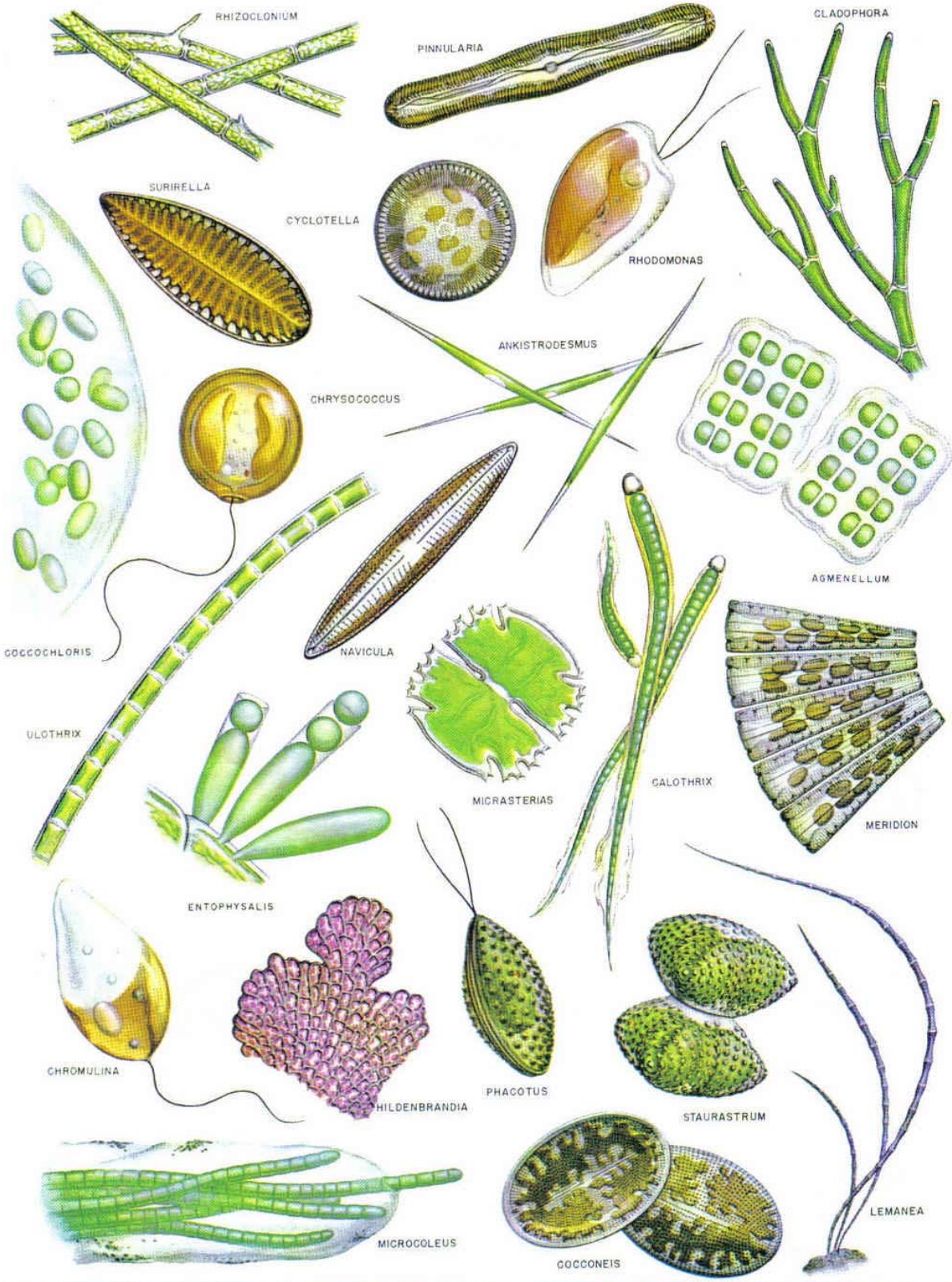


Table B-4.—Clean water algae

Species Names	Linear Magnifications
Agmenellum quadriduplicatum, glauca type	250
Ankistrodesmus falcatus var. acicularis	1000
Calothrix parietina	500
Chromulina rosanoffi	4000
Chrysococcus rufescens	4000
Cladophora glomerata	100
Coccochloris stagnina	1000
Cocconeis placentula	1000
Cyclotella bodanica	500
Entophysalis lemaniae	1500
Hildenbrandia rivularis	500
Lemanea annulata	1
Meridion circulare	1000
Micrasterias truncata	250
Microcoleus subtorulosus	500
Navicula gracilis	1000
Phacotus lenticularis	2000
Rinnularia nobilis	250
Rhizonclonium hieroglyphicum	250
Rhodomonas lacustris	3000
Staurastrum punctulatum	1000
Surirella splendida	500
Ulothrix aequalis	250

Table B-5.—Plankton and other surface water algae.

Species Names	Linear Magnifications
Actinastrum gracillimum	1000
Botryococcus braunii	1000
Coelastrum microporum	500
Cylindrospermum stagnale	250
Desmidium grevillei	250
Euastrum oblongum	500
Eudorina elegans	250
Euglena gracilis	1000
Fragilaria capucina	1000
Gomphosphaeria aponina	1500
Gonium pectorale	500
Micractinium pusillum	1000
Mougeotia scalaris	250
Nodularia spumigena	500
Oocystis borgei	1000
Pediastrum boryanum	125
Phacus pleuronectes	500
Scenedesmus quadricauda	1000
Sphaerocystis schroeteri	500
Stauroneis phoenicenteron	500
Stephanodiscus hantzschii	1000
Zygnema sterile	250

Table B-6.—Algae growing on reservoir walls.

Species Names	Linear Magnifications
Achnanthes microcephala	1500
Audouinella violacea	250
Batrachospermum moniliforme	3
Bulbochaete insignis	125
Chaetophora elegans	250
Chara globularis	4
Cladophora crispata	125
Compsopogon coeruleus	125
Cymbella prostrata	250
Draparnaldia glomerata	125
Gomphonema geminatum	250
Lyngbya lagerheimii	1000
Microspora amoena	250
Oedogonium suecicum	500
Phormidium uncinatum	250
Phytoconis botryoides	1000
Stigeoclonium lubricum	250
Tetraspora gelatinosa	125
Tolypothrix tenuis	500
Ulothrix zonata	250
Vaucheria sessilis	125

Figure B-5

Plankton and Other Surface Water Algae.

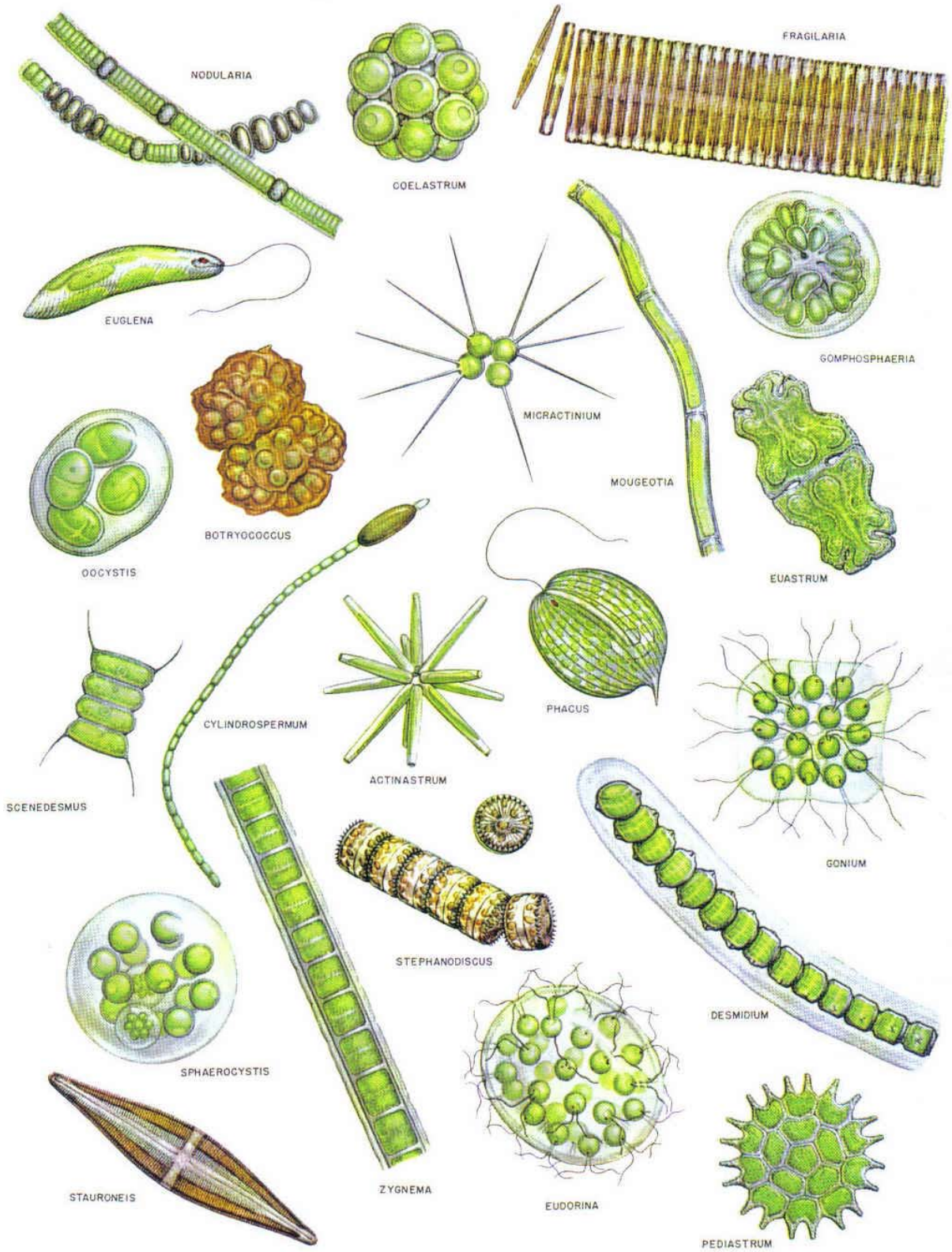
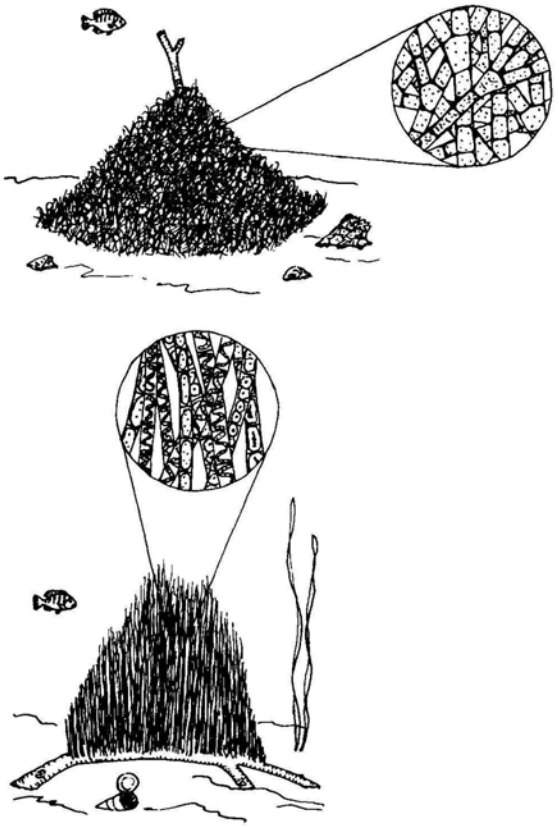


Figure B-6

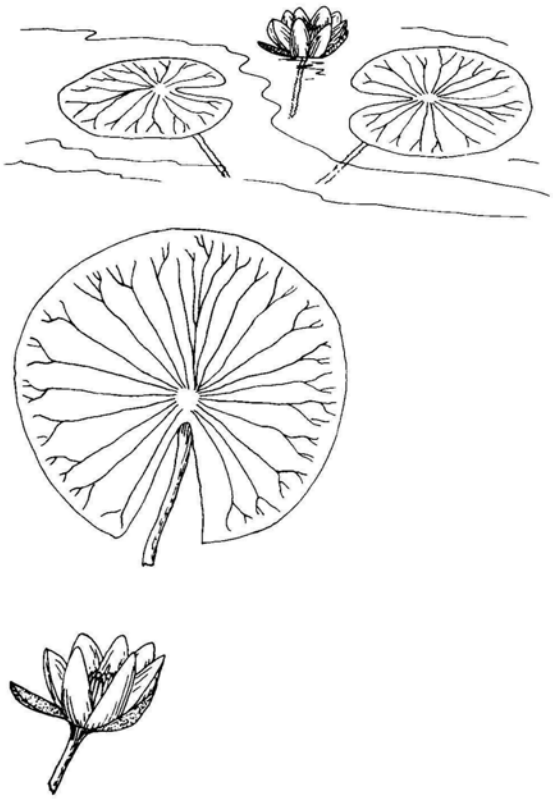
Algae Growing on Reservoir Walls.

Figure B-7

Types of Freshwater Algae.

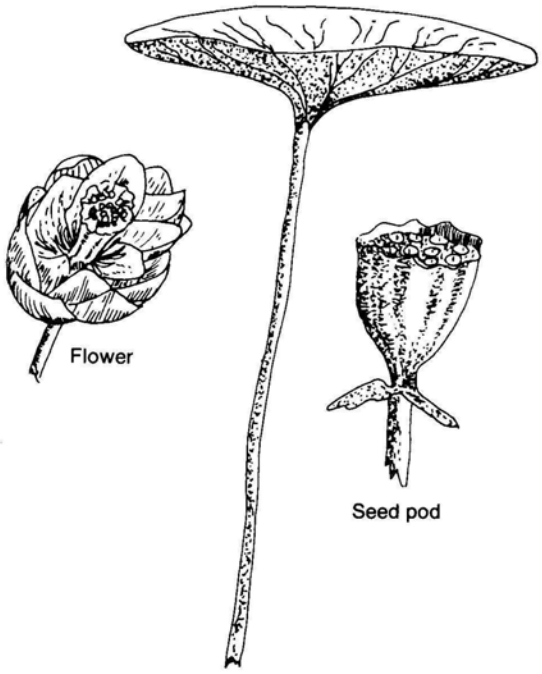


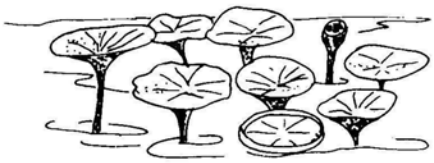
Algal scums (various species) grow on the bottom or on and around objects. Later, they rise to the surface in large mats, whereupon they die and decay. Two forms are present, the branched form (upper) and the single filamentous (below). The branched form is green to grayish-green and coarse feeling like wet cotton. The single filament is slimy to the touch and green-to-brown in color.



Waterlily (*Nymphaea*)
The large, circular, waxy floating leaves are deeply notched and borne on tough, elastic stems. The large white, pink, yellow, or blue flowers, with 12–40 petals, float on the surface with the leaves. The thick inter-twining roots of this plant form extensive mats over the bottom.

Figure B-7





Leaf and stem

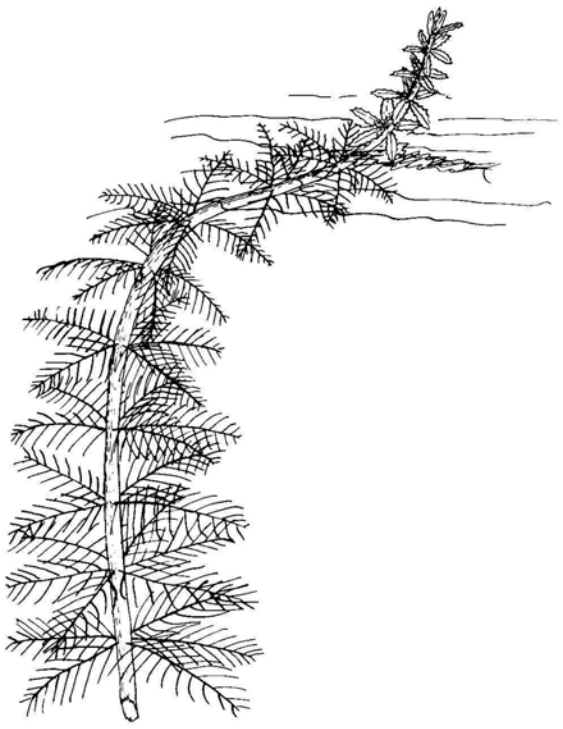
Lotus

Leaves. Circular 12–24 in. in diameter, with the centers "cupped." Usually they stand up out of the water, but immature leaves lie flat on the surface.

Stem. 1/4 to 1/2 in. in diameter, stiff and upright.

Flowers. 4.5 to 10 in. in diameter, pale yellow in color.

Special characteristics. The large, cupped leaves which stand upright are distinctive and characteristic of no other native plant.



Watermilfoil (*Myriophyllum*)

Leaves. Upper aerial ones elliptical with scalloped edges, giving it a prickly appearance, and dark green in color. Late in summer they turn red. Submerged leaves much longer and wider. Finely divided, giving the leaves a feather-like appearance.

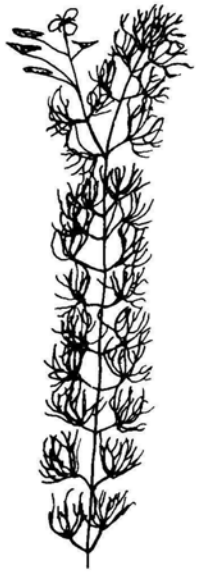
Stems. Thick, reddish to brown, hollow or loosely pith filled.

Special characteristics. The upper leaves of this plant projecting 3–5 inches above the surface of the pond make it easily identified and separated from Parrots Feather.

Habitat. Shallow water 0–5 ft. deep.

Figure B-7

Continued.

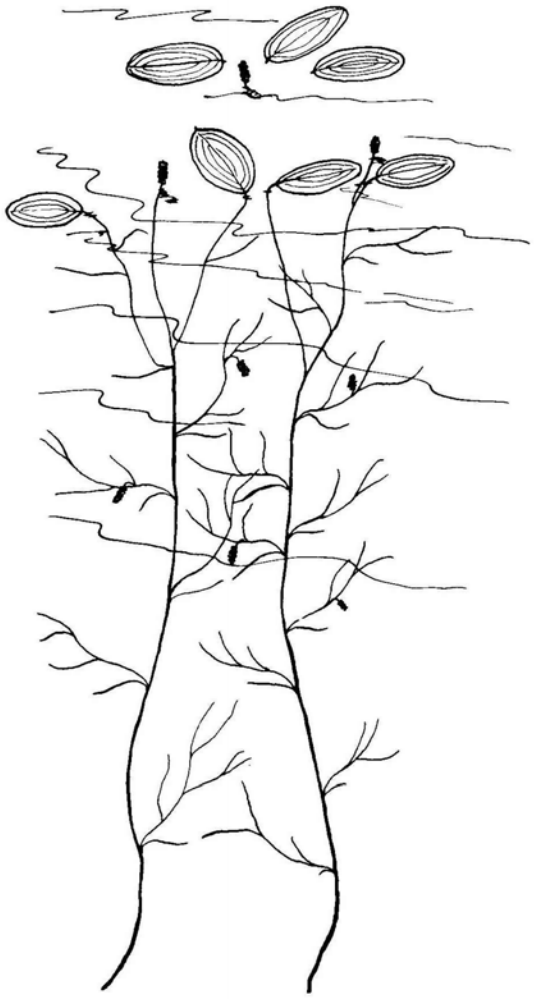


Coontail (*Ceratophyllum*)
A submerged, brittle herb with leaves in whorls about the main stem, which is generally forked once to several times. The leaves are very fine and forked (sometimes divided into threes) at the tips. These "tiplets" have a "spiny" appearance because of their wavy margins. This plant is "rooted" in the spring and early summer and free-floating in the late summer and early fall. The seeds of this plant are taken by waterfowl.

Naiads (*Najas*)
Submerged herbs with opposite or whorled, narrow to thread-like leaves. The bases of the leaves sheathe the stem. The main stem is branched and has fibrous roots. The seeds are small and ellipitical and are found in the axil of the leaves. This plant is a favored food of many ducks.

Fanwort (*Cabomba*)
Delicate, branched, submerged herbs with finely divided leaves that are opposite or in whorls. Occasionally, the upper floating leaves are produced. These are small, oblong, and attached at the center of the blade. The flowers are small and have three white to yellow petals.

Figure B-7



Pond Weeds (*Potamogeton*)

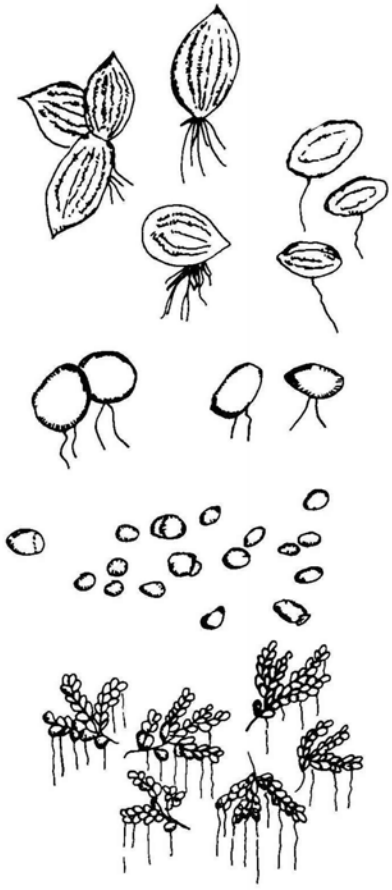
Leaves. Upper floating ones elliptical to oval, generally small (1/2-2 in). One species has very large leaves (3-10 in long). The surface is waxy. In some cases, the upper leaves may be missing. Lower leaves are very narrow, 1-2 mm (0.04-0.08 in) or less and strap-like.

Stems. Thin, but strong, varying in length, according to water depth. Always rooted.

Fruit. The small, cylindrical seed heads are on separate stalks, sometimes appearing above the water or generally found in the axil of the leaves. These seeds are avidly taken by ducks.

Special characteristics. The only plant having leaves this small floating on the surface of the water.

Habitat. Any body of water.



Free Floating Plants

Duckweeds, (*Lemna* and *Spirodela* spp.)
Small, 1–12 mm (0.04–4.7 in) long, free floating green plants of various shapes, generally oblong, that have one to many small rootlets hanging in the water and 1–15 "nerves" appearing on the top of the plants. *Spirodela* is larger and may be purple on the underside. These plants are 1–8 mm (0.04–0.3 in) long, oval in outline with a small pointed tip, have many rootlets, and have 5–11 "nerves" on the upperside. *Lemna* has 1–5 "nerves," one rootlet, and is green on the underside and smaller, being 1–5 mm (0.04–0.2 in). Under some conditions, these plants may have a reddish color. It would be best to check them to prevent confusion with water fern.

Duckmeal, (*Wolffia and Wolfella spp.*)
The tinest flowering plant in the world, 0.5–2mm (0.04–0.08 in) long, rootless, globular to ellipsoid in outline.

Waterfern (*Azolla sp.*)
Larger than the above, 0.5–1 cm (0.2–0.4 in) long, having small overlapping leaves borne on a once-to-several times forking stem. Several small roots hang in the water. At maturity these plants are red, rosy pink, or reddish brown. Young plants are green.

Figure B-7

Continued.

Elodea, or Waterweed (*Anacharis*)

Leaves. Narrow, gradually tapering to the tip. Borne either opposite each other in pairs, or in whorls of 4–5. Leaves of *E. densa* are large and coarse; those of the other two species smaller and more delicate.

Stems. Herbaceous, lax, and generally rooted; sometimes form floating mats.

Flowers. Arise between the stem and leaves. Three petals are present, and these are white or pinkish. Mainly spreads vegetatively.

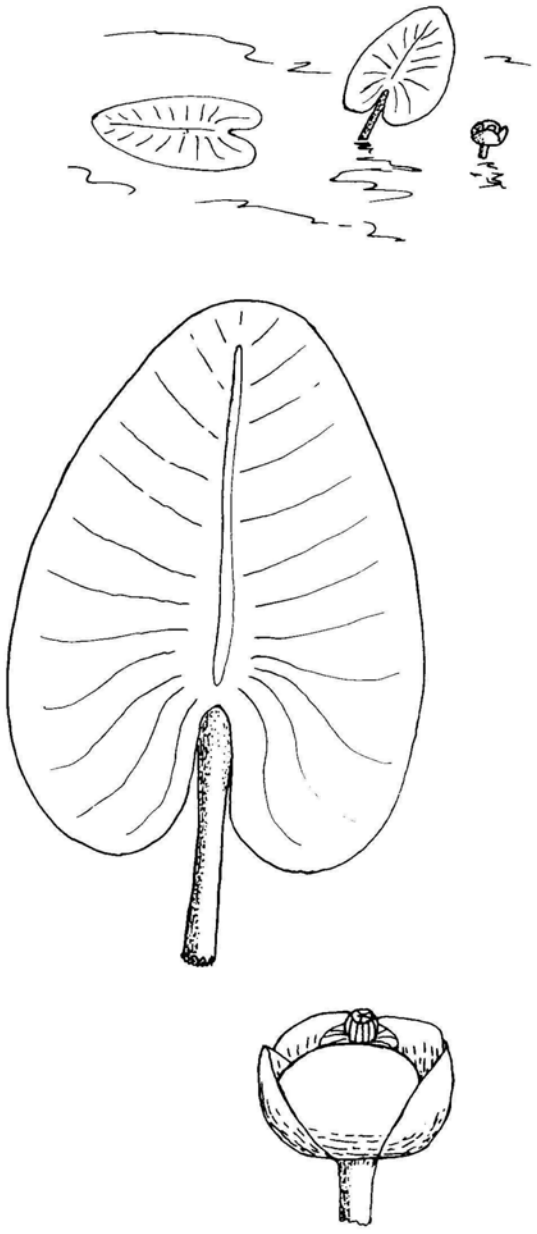
Special characteristics. These are the same plants sold in pet stores for use in aquariums. Perennial, does not die back in the winter.

Habitat. Shallow water of lakes or ponds.

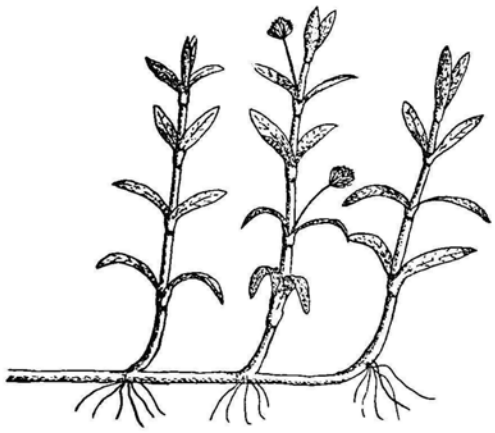
Watershield (*Brasenia*)

The floating leaves are oval and the undersides reddish and covered with a shiny covering. The stems are usually covered with this coating also. The small flowers are reddish to purple and have 3–4 petals. Prefers ponds or slow-moving acid water with a sandy bottom. Some diving ducks readily take the seeds of this plant.

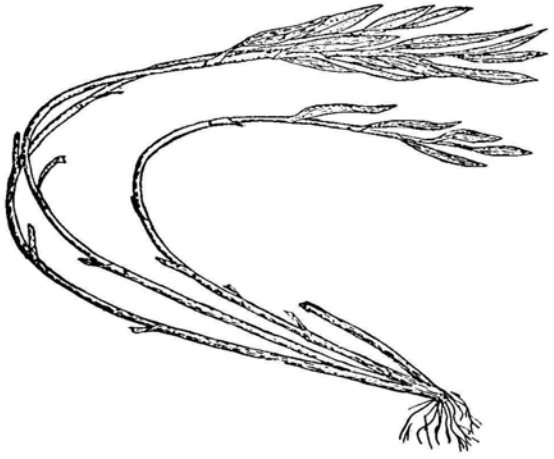
Figure B-7



Spatterdock, Yellow Waterlily (*Nuphar*)
The large, waxy leaves are heart-shaped and may be upright or floating on the surface. The stems are thick, strong, and elastic. The small flowers are yellow and waxy in appearance. This plant is found in the shallows out to a depth of 3–4 feet.



Alligatorweed (*Alternanthera*)
May be found growing upright on damp soil or growing as a floating mat in water. Leaves roughly oval and opposite one another on the stem. The bases of the leaves merge to form a sheath which is slightly swollen. Leaves and stems succulent and fleshy. Flowers white and resemble the flowers of white clover. These are borne on a long stalk growing between the stem and leaf. Seeds are not viable, and this plant reproduces vegetatively from the nodes.



Carolina Watergrass (*Hydrochloa*)
Leaves small (1–2 in long *x* 1/4 in wide), elliptical, grayish-green to green in color. These are found mainly towards the end of the stem and float on the surface. This plant can be found growing next to the shore or in shallow water. May form floating mats which can cover up small ponds. Rarely fruits.